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Mast

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[54] **AUTOMATIC POSITION CALCULATING IMAGING RADAR WITH LOW-COST SYNTHETIC APERTURE SENSOR FOR IMAGING LAYERED MEDIA**

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342/180; 342/196; 342/197

[58] Field of Search 342/22, 179, 180,
342/196, 197, 25, 357

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[57] ABSTRACT

An imaging system for analyzing structures comprises a radar transmitter and receiver connected to a timing mechanism that allows a radar echo sample to be taken at a variety of delay times for each radar pulse transmission. The radar transmitter and receiver are coupled to a position determining system that provides the x,y position on a surface for each group of samples measured for a volume from the surface. The radar transmitter and receiver are moved about the surface to collect such groups of measurements from a variety of x,y positions. Return signal amplitudes represent the relative reflectivity of objects within the volume and the delay in receiving each signal echo represents the depth at which the object lays in the volume and the propagation speeds of the intervening material layers. Successively deeper z-planes are backward propagated from one layer to the next with an adjustment for variations in the expected propagation velocities of the material layers that lie between adjacent z-planes.

8 Claims, 6 Drawing Sheets

